

COURSE OF STUDY	TWO-YEAR MASTER OF SCIENCE PROGRAMME IN MATHEMATICS
ACADEMIC YEAR	2023-2024
ACADEMIC SUBJECT	ELEMENTS OF MATHEMATICAL ECONOMICS

General information	
Term	Second semester (February 26, 2024 – May 31, 2024)
European Credit Transfer and Accumulation System credits (ECTS)	7
SSD	SECS-S/06
Language	Italian
Mode of attendance	Not mandatory

Lecturer	
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Department and office	Department of Mathematics
Virtual meeting room	
Web page	
Office hours	

Work schedule				
	Total	Lectures	Hands-on learning	Self-study
Hours	175	56		119
ECTS credits	7	7		

Learning objectives	
	Mathematical Risk Theory and Quantitative Risk Management.

Course prerequisites	
	Basic notions of Probability, Statistics and Stochastic Calculus. Basic knowledge of financial instruments and their valuation.

Syllabus	
Course contents	Basic notions of risks. Credit risk and basic credit risk derivatives valuation. Structural and intensity-based approach to credit risk. Multi-dimensional risks and copula-based methods. Basic notions of insurance mathematics. The Cramer-Lundbergh model in risk theory. Static Risk measures and their properties. Dynamic risk measures and g-expectations as solutions of Backward Stochastic Differential Equations.
Reference books	McNeil, A.J., Frey, R., Embrechts, P., Quantitative Risk Management, Princeton University Press, 2005. Schmidli, H., Risk Theory, Springer, 2017.
Additional course materials	
Repository	

Expected learning outcomes	

Knowledge and understanding	Basic Notions achievements of Mathematical Risk Theory.
Applying knowledge and understanding	The basic notions provided will be applied to evaluate credit derivatives and basic contracts in insurance markets.
Soft skills	<i>Making judgements</i> : Ability to verify theoretical consistency in valuating insurance instruments.
	<i>Communication skills</i> : Familiarity with the language of insurance markets and ability to express and interpret results.
	<i>Learning skills</i> : Achievements of the basic mathematical methodologies in insurance instruments valuation and mathematical risk theory.

Teaching methods	
	The course will be given in the classroom.

Assessment	
Assessment methods	Oral Exam with 3 questions (4 for "laude") concerning the theoretical content of the course. The questions will be strongly aimed at verifying the achievement of the expected learning outcomes.
Evaluation criteria	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i>: familiarity with the basic notions of risk theory and with the basic valuation methods of insurance instruments provided by the course. • <i>Applying knowledge and understanding</i>: ability to apply the methodologies illustrated in the course to specific valuation problems in insurance models. • <i>Making judgement</i>: ability to develop a critical approach to the choice of valuation methods for specific insurance instruments. • <i>Communication skills</i>: familiarity with the language of insurance markets, ability to illustrate rigorously methods and ideas. • <i>Learning skills</i>: ability to approach critically and autonomously new concepts and ideas related to the contents of the course.
Grading policy	Each question will be evaluated with points 0-10, if all three will obtain 10, a fourth question will be proposed in view of the "Laude".

Further information	
	Attending the course is strongly suggested.